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ABSTRACT

This study evaluated the communicative, social, and emotional development of 22 deaf Swedish pre-school children with cochlear implants over a 2-year period. Video-recordings (every 3 months) and observations of the children in natural interactional settings at home and school as well as interviews with parents and teachers provided the study data. The children were between 2 and 6 years old when the study began and between 4 and 8 years when the last video recordings were made. By the end of the study children had had their implants between 1 and 3.5 years. Sixteen of the children were pre-lingually deaf. No clear patterns were found regarding the effects of variables like time and cause of deafness, time with implant, or time of operation on the children's ability to perceive and produce spoken language at the end of the 2 years. Analysis of videotapes did identify common traits and attitudes of families where the children developed more favorably including establishment of a well functioning communication between the child and parents before the implantation and use of a child-centered communication style by parents and teachers. Another study of the children's continuing development is planned. (Contains 29 references.) (DB)

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COMMUNICATION WITH DEAF PRE-SCHOOL CHILDREN USING COCHLEAR IMPLANTS

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COMMUNICATION WITH DEAF PRE-SCHOOL CHILDREN USING COCHLEAR IMPLANTS

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The study to be presented is a longitudinal, qualitative, psychosocial follow-up study of 22 deaf Swedish pre-school children with cochlear implants, who use sign language.

Basically a cochlear implant is a technical aid which enables deaf individuals to perceive sounds through electrical stimulation of the acoustic nerve. Cochlear implants can however be interpreted to mean different things in different cultural contexts.

In 1981 sign language was acknowledged as the official language of the deaf in Sweden and the schools for the deaf offer a bilingual education in Swedish sign la and Swedish, mainly in its written form. Today the official consensus is that for a child to be considered a cochlear implant candidate the family must have established sign-language communication with their child. The child is regarded as a deaf child before as well as after implantation.

In the Swedish context cochlear implants may be conceptualised and understood differently than in other cultural contexts. Researchers (Fjord, 2000) who have approached the issue from an anthropological point of view describe the culture and society in the US as individual-based where the individuals themselves are responsible for their well-being and for measuring up to the ideal standards. In such a context cochlear implants may be symbolised as having the power to transform the individual from a stigmatised social identity as disabled to a full fledged member of the majority culture.

The Scandinavian countries on the other hand are described as sociocentric with the social group put at the centre of priority. Here cochlear implants are conceptualised as powerful hearing aids which may enable deaf children to perceive and produce spoken language to a varying extent according to their abilities. The implant does not transform personhood and the implanted child continues signing in order to be protected from the failure to speak and from the risk of being left without a peer group. (Fjord, 2000)

The present study has been carried out in this cultural context. It has its theoretical basis within what is generally referred to as "modern" developmental psychology, where children are regarded as competent and able to interact and communicate with their caregivers already from birth. The child is seen as an active co-creator of his own development, which takes place in close relationships with important others in the environment. Instead of focusing on the child's cognitive, intellectual or linguistic abilities, emotional development is recognised as a necessary and fundamental basis for all other aspects of development (Stern, 1985; Trevarthen, 1990; Greenspan, 1997).

Relationships are viewed as the context in which social and emotional development takes place, in which basic competencies emerge, in which communication skills are acquired and in which the regulation of emotions develop (Bowlby, 1982; Preisler, 1983; Hartup, 1985; Stern, 1985). Children also acquire important developmental skills in interaction with peers (File, 1994) and delays in language development may make it impossible for a child to become involved in more complex forms of peer interaction where fantasy and role play are important aspects (Guralnick, 1986). (Preisler et.al., 1997)

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Language acquisition has its roots in the early communicative interplay between caregiver and child. From birth the new-born infant shows a will and ability to enter into social interaction with the adult (Trevarthen, 1979). Both caregiver and child are sensitive to and most likely biologically attuned to the communicative signals of one another. Detailed video-observations of parent-infant interaction also shows that both parties strive to establish inter-subjectivity and mutual understanding (Murray & Trevarthen, 1986).

Through actively taking part in interplay with caregivers the child gains important experiences of being understood and being able to understand others; that actions have effects on others and that responses from others can be elicited (Thoren, 1994). In this early interplay the rules governing social interaction are acquired.

Children are also born with the ability to use symbols to represent the world around them and to organise their experiences. The capacity to use symbols enables the child to acquire and use language as a means of obtaining further knowledge and experiences. But the most important prerequisite for all learning – of language and knowledge alike – is that a well functioning communication between caregiver and child is established. Already from an early age children have a wish and need to discover and explore people, objects and activities and to ask questions about the world around them, but also to express their own feelings. This takes place in the natural interactions between children and caregivers as part of the everyday activities and games that develop in every single family and not through deliberate instruction or teaching on the part of the parents.

Longitudinal studies of deaf children who have had access to sign-language communication from an early age have shown that their pre-lingual and linguistic development follows the same developmental steps as in hearing children (Volterra, V. & Erting, C., 1990; Malmström, 1991; Ahlgren 1994). The idea that one language system hinders the development of another, still sometimes held, is by no means valid. This applies to sign language as well as to any other language. Studies have also shown the positive effects of sign-language acquisition in deaf children, not only on communicative, social and emotional development but on language learning in general (Nordén et.al., 1981; Preisler, 1981, 1983; Heiling, 1995).

The aim and method of the study

The primary objective of the study was to describe the children's communicative, social and emotional development over a two year period, with the main focus on the communicative development of the children and the communicative styles of parents and teachers. Questions posed were: How do children with cochlear implants communicate with their parents, teachers and peers, at home and in their pre-school settings? Is it possible to identify factors in the environment that seem to promote or hinder the development of the children and if so how can they be described? How and under what circumstances do the children take advantage of their implants – the counter-question being, under what circumstances do the children not seem to take advantage of their implants?

Video-recordings and observations of the children have been made in natural interactional settings at home with parents and siblings and in the pre-schools with teachers and peers. Interviews have also been conducted with parents and pre-school teachers as well as with the members of the implant teams.

The group of children

Twenty-two children and their parents took part in the study, out of a total population of 27 children born between 1990 and 1994 and operated before the summer 1996. The families, who lived in the larger cities as well as in urban and rural areas all over the country, comprise a cross-section of the Swedish population with all educational and income levels as well as different family constellations represented.

Table 1. Sex and year of birth

Born/ Sex	1990	1991	1992	1993	1994	Total
Boy	3	3	1	3	1	11
Girl	3	5		2	1	11
Total	6	8	1	5	2	22

The group of children consists of an equal number of boys and girls, born between 1990 and 1994. They were between 2 and 6 years old when the study began and between 4 and 8 years old when the last video recordings were made. All the children had Nucleus/Cochlear mini 22/20+2 implants.

Table 2. Time and cause of deafness

Deafness	Number
< 2 years of age	
Pre-lingual meningitis	4
Pre-lingual deafness, cause generally unknown	12
2 – 4 years of age	
Post-lingual meningitis	2
Post-lingual progressive hearing loss	4
Total	22

The majority, or 16 of the 22 children, are pre-lingually deaf while 6 children became deaf after they had started using oral language. Of the 16 pre-lingually deaf children 12 are most likely born deaf while 4 became deaf before 1½ years of age, due to meningitis. Six of the children became deaf between 2 and 4 years of age – 4 due to progressive hearing loss and 2 due to meningitis.

Table 3. Time of deafness and age at operation in years and months

Age at operation/ Deafness	1:11 - 2:11	3:0 - 3:11	4:0 - 4:11	Total
< 2 years	7	4	5	16
2 - 4 years		4	2	6
Total	7	8	7	22

The children were operated when they were between 1 year and 11 months and 4 years and 10 months old.

Table 4. Time of deafness and time with implant in years and months at the end of the study

Time with CI/ Deafness	1:0-1:5	1:6-1:11	2:0-2:5	2:6-2:11	3:0-3:5	Total
< 2 years	3	5	3	4	1	16
2 – 4 years	1			2	3	6
Total	4	5	3	6	4	22

When we made our last home visits and the final video recordings, the last operated children had been using their implants for a little more than a year while the children who had used them the longest had been using their implants for close to 3½ years.

Table 5. Pre-school placement at the time of the first visit in the pre-schools

Pre-school placement	Number
Pre-school for deaf children using sign language	8
Pre-school for deaf and hard-of-hearing children where sign language and spoken language were used	10
Mainstreamed in a regular pre-school with a personal assistant	3
Mainstreamed in a regular pre-school without a personal assistant	1
Total	22

When they started to take part in the study 8 of the 22 children attended pre-schools for deaf children where sign language was used and 10 attended pre-schools for deaf and hard-of-hearing children where both sign language and spoken language were used, while 4 children were placed in regular pre-schools for hearing children with or without a personal assistant using sign language. During the study the pre-school placement was changed for some of the children. A few children attended a pre-school for deaf and hard-of-hearing children some days a week on a part time basis and a regular pre-school for hearing children the rest of the week.

Hence there is a considerable variation in background factors generally considered important in studies of children with cochlear implants such as time and cause of deafness, time of operation, time with cochlear implant and pre-school placement.

Video-recordings were made approximately every third month during the two years of study, alternating between recordings at home and in the pre-school. Both the first and the last visits were made at home and on these occasions the parents were also interviewed. Between 3 and 7 video-recordings have been made of each child depending on when they started to take part in the study. Altogether 72 recordings have been made in the home settings and 57 in the pre-school settings.

Results

The following presentation focuses mainly on the development of communication in the families, which turned out differently in the various families during the two years of observation.

In the first video-recordings parents and children communicated mainly in sign language. Even if the parents sometimes used single spoken words, sign language was the natural basis of communication.

With the small children the dialogues were about everyday things and activities. Parents and children directed their attention to and reached a mutual understanding about the here and now. Both parties made a point of establishing eye-contact before signing and maintaining it throughout the conversation. Establishing a common focus is one of the most important steps in language development and something children normally learn to do within their first year.

With the older children who had a well developed sign language the content was more advanced. Now parents and children could also form associations with absent phenomena. Being able to talk about what has happened in the past as well as what will happen in the future are important steps in the children's development towards abstract thinking.

There were however also families where parents and children did not share much common language. Even if they could establish a certain understanding in actions they did not have any extensive linguistic communication. The dialogues that occurred were mostly of a simple question-and-answer character, in two turns only, and misunderstandings were frequent. Without a shared language the content of the dialogues can not be developed on a level which corresponds to the child's cognitive ability. Then there is a risk that the child is deprived of the stimulation needed for further development.

As time passed parents gradually began to introduce more sounds and spoken language in their communication with the children. Primarily the parents started to use spoken words simultaneously when they signed, but sometimes the sounds themselves could play a part in the dialogues.

The way parents and other adults communicated with the children could be identified as either supporting and child-centred or directing and adult-centred. This has also been described in several other studies (Thoren, 1994; Preisler et.al., 1994, Ahström, et.al., 1996, 1998; Ahlström, 2000).

When parents use a directing, adult-centred communicative style, the parent is the one who initiates the topics and guides the conversation. The interplay takes on an adult perspective in that the parent requests the child to direct attention to what the adult intends to talk about, and keep to the subject. Generally the adult poses many questions to the child about the subject of the conversation and primarily questions that have a correct answer. Corrections of wrong answers as well as praise for correct ones are common.

Parents who adopt a supportive, child-centred communicative style on the other hand, adapt their communication to the interests and linguistic ability of the child. The interplay is based on the child's point of view and concentrates on what the child is interested in at the moment. The child is encouraged to initiate new topics, while the adult picks up and comments on the child's contributions and shows that the child has made himself understood. Through their remarks and comments the parents try to maintain the subject and stimulate the child to further elaborate on the dialogue.

In the video-recordings we could observe several parents exhibiting a child-centred communicative style in their interaction with the children. In these cases the conversations could develop into extensive dialogues in many turns. The conversations started out from the child's interests and throughout the focus was on the content. The dialogues were meaningful and the interplay was flowing smoothly back and forth between parents and children. In some cases the dialogues developed into narratives that were part of the life stories children create. Being able to create an autobiographic narrative is an essential aspect of the child's development of identity and sense of self (Stern, 1985, 1990).

When the child initiated a new subject these parents followed, answered and expanded on the subject in relation to the child's interests and utterances. On several occasions we could observe that the children started to use sounds and spoken words concurrently with signs as they became more absorbed in the conversations. However, when the content became

complicated and difficult to convey they went back to using sign language only. The parents never made any demands on the children's language production – neither in signs nor in spoken words, but focused entirely on the content and answered, irrespective of form.

In families where the parents used a child-centred communicative style, with focus on the dialogues, the children showed a positive language development, in sign language as well as in spoken language. The children who developed most spoken language were also children who were often engaged in such interactions with their parents.

There were, however, also examples of more adult-centred interactions in the study. Here the parent took command and tried to make the child take part in a conversation by asking questions. Generally the parent had decided upon the subject of the conversation in advance. The focus in several of these conversations was more on the form than on the content of the dialogue. If the parents also required the child to perform, linguistically or otherwise, the child often objected in different ways.

In some cases parents chose to introduce spoken language as different exercises where the children were expected to perceive and maybe also produce spoken words. In these activities the focus was on perceiving which sounds and words were produced, not on conveying a content by way of language. If some words were hard to perceive or the children did not understand their meaning, it could be difficult for them to find the activities meaningful. In these cases the children often co-operated with interest to begin with but gradually became more and more reluctant, which they expressed in various kinds of protests. There is a risk that children who repeatedly fail in such exercises eventually will associate spoken language with demands and feelings of inferiority.

As the parents gradually began to use more and more spoken language they sometimes forgot to establish eye contact before speaking and maintaining it throughout the conversation. This affected turn-taking and the dialogues were discontinued. If the child could not perceive what was said through hearing only, there was no interplay. Even in cases where the child could understand quite a lot of spoken language, communication broke down when eye-contact was not established and maintained. Adults using cochlear implants also stress the importance of eye-contact for communication.

However, even children who could understand a good deal of spoken language and who could manage an oral conversation with their parents had great difficulties in communicating orally with peers. The relation between child and adult can be described as vertical, where the adult takes on responsibility for the interaction and makes it work through adjusting communication and explaining, repeating and clarifying to the extent needed. The relation between children is horizontal, between equals, where no one can be expected to take on a greater responsibility for the interplay (Hartup, 1989). Hence, the fact that communication works between children and adults does not always imply that it works between peers.

Some of the children gradually began to perceive and understand more spoken language which meant that the parents also used more spoken language in familiar settings. In the interviews they described that they used less sign language as they saw that the child gradually understood more spoken language. In some of the families, where the children had been using their implants for quite some time, the parents occasionally used spoken language only in situations where they believed that the children could understand, even if the children themselves did not always answer in spoken language.

In the last recordings, we observed a few children who perceived a good deal of what the parents said and who also used quite a lot of oral language themselves. In these families the parents had changed to using mainly oral language and the children themselves also used more oral language than sign language in communication with parents and siblings. In the observations of interactions in the close and familiar situations we had registered,

communication flowed smoothly. Even if we as outside observers did not always understand what the children said it was obvious that the parents did, judging from how the dialogues evolved. These children can however not be seen as representative of the group as a whole. There were also children in the group who did not use any spoken language at all in the communication with people in their surroundings.

Most of the children in the study could not take part in oral conversations in natural interactional settings beyond the simplest kind, like answering a question, even if they could perceive some spoken language and also produce single words themselves. But as soon as the given context was left and more advanced subjects were brought up – when an explanation was needed or when the parents wanted to ensure that they had made themselves understood – sign language was a necessity. This was evident in the video-recordings and it was also something the parents themselves pointed out in the interviews.

It was also evident from the analyses that the children who had developed most oral language also had a well developed sign language. These children had an obvious awareness of the function of language in communication and interplay and were used to understand and be understood. When misunderstandings occurred, whether depending on the fact that the children had not perceived or that the adults around them had not understood, the children tried to make repairs by asking for repetitions or for more information, or through changing their own way of communicating in order to facilitate for the partner.

Sign language in itself was however no guarantee for the development of spoken language among the children in the study. But children who had an insufficient sign language or whose sign-language development was discontinued also had very little or no spoken language. In a few cases we observed children who had very little sign language to begin with, but as their sign language increased they also developed more spoken language – something that was commented on by their parents as well.

Conclusions

The children in the study had developed differently with their implants, but we could not see any clear patterns regarding the effects of variables like time and cause of deafness, time with implant or time of operation on the children's ability to perceive and produce spoken language after two years of study.

One conclusion that can be drawn however, is that the children are individuals with different capacities and needs and they differ from one another just as much as other hard-of-hearing and deaf children do. Hence, regarding children with cochlear implants as a uniform group will generally be misleading.

In the analysis of the video-recordings certain common traits and attitudes could be identified in the families where the children developed more favourably – generally as well as linguistically. The factors or circumstances that could be considered to promote a positive development can be described as follows:

- that a well functioning communication between the child and the parents was established already before the implantation
- that parents and teachers used a child-centred communicative style in their interaction with the child rather than an adult-centred communicative style
- that the child did not experience demands from the environment to achieve, particularly not with respect to speech-production and perception

- that the adults put reasonable demands on the child with respect to the child's age, maturity and capacities
- that focus was on the content of the dialogues not on the linguistic form
- that the child had the possibility to discuss present experiences as well as experiences of past and future events with parents and teachers in order to create "narratives"
- that there was a joyful and meaningful communication between child and adult
- that the child could take part in age-adequate pretend- and role-plays

and also, which became evident in the interviews

- that the parents were satisfied and felt confident with the decision of having their child operated
- that parents and teachers, habilitation staff and implant teams could co-operate around the child.

For eight of the children in the study all or most of the above mentioned circumstances were present. All of these children had a well functioning sign language and could communicate freely with parents, teachers and peers. Parents and teachers exhibited a child-centred communicative style, they posed reasonable demands and the children could enter into fantasy and role play with other children and adults. The children who perceived, produced and understood most spoken language also belonged to this group. They used spoken words in communication with others, several of them could produce 3-5 word sentences, and some even longer sentences, in well known contexts. The children understood more than they could produce and could understand a great deal of what the parents said, provided the context was clear. By the end of the study single children used more spoken language than sign language with their parents. According to our judgement these children had a stimulating linguistic environment.

All of the children used their implants without problems and the implant was never an issue of conflict. The group consisted of three boys and five girls. Five of the children were pre-linguallay deaf and three post-lingually. They were between 2:4 years and 4:11 years when implanted and they had been using their implants between 1:8 and 3:5 years by the end of the study.

For a second group of children, six boys and four girls, a smaller number, or only a few, of the circumstances promoting the development of the children were at hand. There could have been difficulties when deciding about the operation or uncertainty as to whether the child developed normally. In some cases the children exhibited an adequate sign language for their age at the first recordings, but this development was later discontinued. In other cases they had a far less well-developed communication. For most of the children communication with parents and teachers was generally adult-centred and focussing more on form than on content. In some cases the adults posed what we perceived as high demands on oral/aural skills. In other cases the demands on the children's general behaviour were too low and they were treated as far younger than their age. Fantasy and story telling as well as pretend- and role-play were seldom observed among the children in this group. Instead of receiving a rich linguistic stimulation, nourishing both sign-language development and the development of spoken language, many of these children were living in a poor linguistic environment.

Most of the children in this group used their implants daily without problems but there were children who did not use their implants as regularly as the others, which could become a source of conflict between parents and children. Seven of the children in this group were pre-lingually deaf and three post-lingually. They received their implants when they were between

2:2 and 5:0 years of age and had worn them for between 1:1 and 3:5 years at the end of the study.

Finally there was a third group of children, two boys and two girls, who received a rich sign-language stimulation in their pre-school settings and could communicate in sign language with teachers and peers. In some of the families a well functioning sign-language communication was established while in others communication was mainly based on non-verbal expressions in combination with speech and single signs. Some of the children in this group did not use their implants regularly, which was a source of conflict in the families. Most of the factors and circumstances considered beneficial to the children's development were not, or only partly, present. In these children speech perception and speech production was practically non-existent. They were considered by the researchers as well as by their teachers to be just as deaf after the implantation as before. The children, who were all pre-lingually deaf, were between 3:0 and 4:9 years old when receiving their implants and had, to a varying extent, been using them for between 1:8 and 3:0 years.

Today 15 of the 22 children in the study are school children and another 5 will start school this fall. They are now taking part in a continued longitudinal follow up study in their different school settings.

Table 6. School placement and time of deafness

School placement/ Deafness	Sign-language class for the deaf	Class for the hard of hearing	Regular class	Total
< 2 years	6		3	9
2 - 4 years	1	2	3	6
Total	7	2	6	15

Of the 15 children who have started school 7 receive their education in sign-language classes, mainly at the schools for the deaf. Two children attend classes for the hard of hearing where spoken Swedish is used – sometimes with sign support – and sign language may also be offered as a special school subject. Six children attend regular classes for hearing children supported by a personal assistant using sign language.

Today the children in the study have been using their implants for between almost 4 and 6½ years and the coming study will hopefully tell us more about the development of children with cochlear implants in a long-term perspective.

However, what the present study clearly shows, is that single factors are not tenable as explanations of a better or poorer development, instead a complex network of factors and relationships taken together is of essential importance. This has also been pointed out by many other researchers in child development (Schaffer, 1985; Leeber, 1998). Hence in order to be able to promote their development it is necessary to take the entire social reality of the children into consideration (Belsky 1990; Rutter, 1991).

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